

NON-UNIFORM ETCHING OF ANODE FOIL TO PRODUCE HIGHER CAPACITANCE GAIN WITHOUT SACRIFICING FOIL STRENGTH

ABSTRACT

The present invention is directed to a method of etching anode foil in a non-uniform manner which increases the overall capacitance gain of the foil while retaining foil strength. In particular, by using a mask to protect a mesh grid of the foil from further etching, a previously etched foil can be further etched, prior to the widening step. Alternatively, the mask may be used in the initial etch, eliminating the need for the second process. In effect the foil may be etched to a higher degree in select regions, leaving a web of more lightly etched foil defined by the mask to retain strength. According to the present invention, the foil is placed between two masks with a grid of openings which expose the foil in these areas to the etching solution. The exposed area can be as little as 10 % of the total foil to as much as 95 % of the total foil, preferably 30 % to 70 % of the total foil area. The pattern is configured in such a way that the enhanced area does not create large scale strength defects such as perforation holes and is held in a pattern such as a hexagonal array, random array or radial burst array, such that the exposed area perimeter can be round, square, hexagonal, or triangular. The higher surface area in the exposed areas does not significantly decrease the strength of the foil as a whole, such that the method according to the present invention increases capacitance of the anode foil without significantly decreasing the strength of the foil.